

WHAT IS CLAIMED IS:

1. A crystallization apparatus which generates a crystallized semiconductor film by irradiating at least one of a polycrystal semiconductor film and an  
5 amorphous semiconductor film with light beams having a predetermined light intensity distribution, comprising:  
an irradiation system which is used to irradiate at least one of the polycrystal semiconductor film or the amorphous semiconductor film with light beams  
10 having a light intensity distribution with an inverse peak pattern that a light intensity is increased toward the periphery from an inverse peak at which the light intensity is minimum,  
wherein a light intensity value  $\alpha$  (standardized value) of the inverse peak when a maximum value of the  
15 light intensity in the light intensity distribution with the inverse peak pattern is standardized as 1 falls within a range of  $0.2 \leq \text{value } \alpha \leq 0.8$ .
2. The crystallization apparatus according to  
20 claim 1, wherein the light intensity distribution with the inverse peak pattern is a light intensity that an irradiation surface provided to at least one of the polycrystal semiconductor film and the amorphous semiconductor film does not generate ablation.
- 25 3. A crystallization apparatus which generates a crystallized semiconductor film by irradiating at least one of a polycrystal semiconductor film and an

amorphous semiconductor film with light beams having a predetermined light intensity distribution, comprising:

a first irradiation system which irradiates a predetermined area of at least the polycrystal semiconductor film or the amorphous semiconductor film with light beams having a substantially homogeneous light intensity distribution; and

a second irradiation system which irradiates the predetermined area with light beams having a light intensity distribution with an inverse peak pattern that a light intensity is increased toward the periphery from an area in which the light intensity is minimum.

4. The crystallization apparatus according to claim 1, further comprising:

intensity ratio variable means for varying an intensity ratio of the light beams emitted to the predetermined area by the first irradiation system and the light beams emitted to the predetermined area by the second irradiation system.

5. The crystallization apparatus according to claim 3, further comprising:

a beam source which can provide light beams having a predetermined wavelength, the light beams being supplied (led) to each of the first and second illumination systems; and

light beam dividing means for dividing the light

beams from the beam source into light beams to be supplied to the first irradiation system and the light beams to be supplied to the second irradiation system,

wherein the light beam dividing means can  
5 independently set an intensity of the light beams to be supplied to the first irradiation system and an intensity of the light beams to be supplied to the second irradiation system.

6. The crystallization apparatus according to  
10 claim 5, wherein the first irradiation system includes:

a first illumination optical system used to substantially evenly illuminate a first predetermined surface with light beams divided by the light beam dividing means; and

15 a first image formation optical system which is arranged in a light path between the first predetermined surface and the predetermined area, and

wherein the second irradiation system includes:

a second illumination optical system used to  
20 substantially evenly illuminate a second predetermined surface with the light beams divided by the light beam dividing means;

a light beam modulation element arranged on the second predetermined surface; and

25 a second image formation optical system which is arranged in a light path between the second predetermined surface and the predetermined area.

7. The crystallization apparatus according to claim 6, further comprising:

light beam combining means for combining light beams from the first illumination optical system with  
5 light beams from the second illumination optical system.

8. The crystallization apparatus according to any of claims 3 to 6, wherein both the first irradiation system and the second irradiation system irradiate the  
10 predetermined area from directions different from each other.

9. The crystallization apparatus according to claim 8, further comprising:

measuring means for measuring a light intensity  
15 distribution in the predetermined area,

wherein an intensity ratio of light beams having the homogeneous light intensity distribution and light beams having the light intensity distribution with the inverse peak pattern is changed in accordance with a  
20 measurement result of the measuring means.

10. A crystallization method which generates a crystallized semiconductor film by irradiating at least one of a polycrystal semiconductor film and an amorphous semiconductor film with light beams having a  
25 light intensity distribution with an inverse peak pattern that a light intensity is increased toward the periphery from an inverse peak at which the light

intensity is minimum,

wherein a light intensity value  $\alpha$  (standardized value) in the inverse peak when a maximum value of the light intensity in the light intensity distribution with the inverse peak pattern is standardized as 1 is set to  $0.2 \leq \text{value } \alpha \leq 0.8$ .

11. A crystallization method which generates a crystallized semiconductor film by irradiating at least one of a polycrystal semiconductor film and an amorphous semiconductor film with light beams having a predetermined light intensity, comprising:

irradiating a predetermined area of at least one of the polycrystal semiconductor film and the amorphous semiconductor film with light beams having a substantially homogeneous light intensity distribution; and

irradiating the predetermined area with light beams having a light intensity distribution with an inverse peak pattern that a light intensity is increased toward the periphery from an area in which the light intensity is minimum concurrently with at least light beams having the homogeneous light intensity distribution or within a range of a predetermined time difference.